Scholar Publishing Group
International Journal of Health and Pharmaceutical Medicine
https://doi.org/10.38007/IJHPM.2020.010403
ISSN 2789-8393 Vol. 1, Issue 4: 25-37

# *Clinical Analysis of the Relationship between Thyroid Cells under Microscope and Elderly Heart Failure in Patients with Hypothyroidism*

**Haoran Wu**

*Dalian Medical University, Liaoning, China*

*Whr1885@dmu.edu.cn*

***Keywords:*** Congenital Hypothyroidism, Heart Failure, Thyroid Hormone, Heart Function, Elderly Patients

***Abstract:*** With the deepening of research, the etiology and pathogenesis of hypothyroidism and heart failure are becoming more and more clear, but the study of the relationship between the two has not been too good. The purpose of this article is to explore the relationship between hypothyroidism and heart failure using microscope imaging techniques, starting with the impact of hypothyroidism on heart and other organ functions. In this paper, 76 elderly patients with hypothyroidism and heart failure were selected from a hospital as the research object, and 76 samples were divided into an experimental group (n=38) and a control group (n=38). The experimental group was given a two-week drug treatment for the symptoms of hypothyroidism. Each morning, levothyroxine sodium tablets were taken orally, while the control group was not given drug treatment. Two weeks later, the thyroid function and heart function of the two groups of patients were compared. According to the experimental results, the treatment of hypothyroidism can optimize their thyroid function, and the heart function also improved. The number of patients in the experimental group was reduced by 4 cases, which was converted into Grade III patients, and 11 of the original grade III patients were converted to grade II patients. This proves that hypothyroidism is closely related to heart failure in the elderly.

## 1. Introduction

### 1.1. Background Significance

Hypothyroidism is a kind of endocrine disease, especially common in neonatal diseases, which is an important cause of mental retardation in children. The disease incidence rate is high, the patient is mostly newborn, and is a great threat to the healthy growth of children all over the world. However, its damage to the middle-aged and old people can not be underestimated, which seriously affects the central nervous system and heart function of patients. There are many studies on this

kind of disease, including etiology screening, treatment effect and influencing factors, which also reveal its serious harm. But most of the studies are aimed at newborn patients, ignoring the group of elderly patients, hypothyroidism is more harmful to the elderly with weak resistance, and the elderly may suffer from other diseases at the same time due to their complex physical conditions. It also hinders the screening and treatment of hypothyroidism.

As the pressure of life increases, the number of sub-healthy people gradually increases, and the symptoms of heart failure appear more frequently. Heart failure is not an independent disease, but many cardiogenic and non-cardiogenic diseases interact with each other, leading to a decrease in diastolic function of the heart, which leads to a series of symptoms [1]. Complex symptoms have brought many inconveniences to the diagnosis and treatment of heart failure. The patients with heart failure are mostly elderly people, and the etiology is more complicated [2]. There are many studies on heart failure at present, but there are few in-depth studies on thyroid function. This article explores another way to analyze the relationship between hypothyroidism and elderly heart failure, and provide new ideas for the prevention and treatment of heart failure.

### 1.2. Related Work

Roy S. evaluated the dependence of hsCRP changes on total bilirubin (BT) and fT4 levels in 30 patients with dominant and 30 patients with subclinical hypothyroidism (SH). Serum BT, hsCRP, thyroxine and TSH were measured in both groups and compared with 40 control groups. Serum TSH and hsCRP in hypothyroidism patients were higher than those in the control group ($P<0.001$), and fT4 and BT were lower than those in the control group ($P<0.001$ and 0.03) [3]. His research shows that bilirubin can be used to treat hypothyroidism, but does not specifically analyze the effects of hypothyroidism on various organs of the body. Lv, Z's study aimed to clarify the effects and mechanism of DEHP on obesity and hypothyroidism, and to explore the relationship between them. He treated male C3H/He mice with DEHP for 5 weeks, and recorded the body weight, food intake and body temperature during exposure. After exposure, q-PCR, Western blot, ELISA and other methods were used to analyze the key organs and serum [4]. His study, which uses a different method to analyze the data, appears to be scientifically accurate, but was conducted on mice and has substantial differences from real patients, and the results can only be used as a reference. Gregg C Fonarow analyzed the data of 48,612 patients with heart failure and used a Web-based registry to collect patient admission, hospitalization, discharge care and outcome data. The registry provided real-time feedback to other hospital benchmark performance indicators and tools for nursing process improvement, including evidence-based best practice algorithms [5]. Although his study was based on a large database, it analyzed only the quality of hospital care for patients with heart failure, and did not look into how to reduce the incidence of heart failure or prevent it.

### 1.3. Innovative Points in this Paper

In this paper, the author innovatively analyzed the impact of hypothyroidism on various organ systems of the body, compared thyroid function data and heart function grade of patients, and discussed the relationship between hypothyroidism and heart failure in the elderly. Seventy-six elderly patients, aged 60 years and above, who were conscious and willing to cooperate with the study, were selected from a hospital with both hypothyroidism and heart failure. In all patients with cardiac function classification and thyroid function test after collecting relevant data, using random lottery will patients randomly divided into experimental group and control group on average, according to the experimental group a two-week thyroid function to reduce drug treatment, while

control group not for thyroid function to reduce treatment, also cannot eat other influence the experimental results during the period of drugs. At the end of treatment, cardiac function grading and thyroid function testing were performed again, and the data of the two groups were compared. According to the experimental results, the relationship between thyroid hormone and cardiovascular system was found, thus the relationship between thyroid dysfunction and heart failure in the elderly was presumed, which opened a new direction for the research on prevention and treatment of heart failure in the elderly.

## 2. Proposed Method of Hypothyroidism and Heart Failure in the Elderly

### 2.1. Development and Research of Hypothyroidism

Congenital hypothyroidism (CH) is one of the most common endocrine diseases in pediatrics, which is a variety of clinical symptoms caused by the thyroid axis generation, development and functional metabolism disorder in embryo, leading to the thyroid function reduction and thyroid hormone deficiency in blood circulation [6]. Untreated after birth, congenital hypothyroidism can cause developmental delays and mental retardation. Diagnosis and treatment are often delayed because the initial symptoms are atypical. Neonatal disease screening, through early detection and diagnosis, regular observation and treatment, can improve the prognosis of CH children, avoid most children's severe mental retardation and physical development lag.

(1) Etiology and prevention of hypothyroidism

Hypothyroidism is a series of clinical symptoms, such as a lack of serum thyroid hormone or resistance to its effects, the body's metabolism, decreased function of various systems, and water and salt metabolism disorder.

There are many causes of hypothyroidism, but hypothyroidism for a variety of reasons is related to regional and environmental factors (dietary iodine content, goiter substances, genetics and age, etc.). Screening of newborns in many parts of the world has found one in every 4,000 to 5,000 babies born with hypothyroidism. The incidence of hypothyroidism in the elderly varies from country to country and is usually between 1% and 14% [7]. CH can be divided into primary hypothyroidism, peripheral hypothyroidism (central hypothyroidism), and temporary hypothyroidism according to the etiology.

About 85% of primary thyroid function decrease by improper in thyroid development, stunted growth or decline in the process of transfer to stay somewhere in between your tongue and thyroid cartilage, caused by thyroid dysplasia is almost out, only 2% of them are families, 15% are synthetic thyroid hormone disorder, it is in the process of thyroid hormone synthesis due to the lack of one or more of the enzyme, is autosomal recessive hereditary disease, familial has obvious; Central hypothyroidism mainly refers to the growth hormone, alanine, luteinizing hormone and other hormones caused by hypothyroidism; A temporary thyroid loss caused by the presence of antithyroid antibodies in the child's body due to the mother's use of antithyroid drugs or the mother's autoimmune disease, usually returns to normal within 3 months.

The prevention of hypothyroidism needs to start from the etiology. For the prevention of neonates, it needs to start from the gestation period of the mother, supplement appropriate amount of iodine, and avoid taking overdose of anti-thyroid drugs. Regular screening should be maintained for adults, especially women with a family history of thyroid disease or during pregnancy, and timely treatment of other thyroid diseases that are prone to hypothyroidism. In order to prevent the relapse after hypothyroidism healing, should comprehensive recuperate, maintains the good diet habit and the exercise, strengthens the physique.

(2) Clinical symptoms and effects of hypothyroidism

The severity of hypothyroidism can affect the clinical symptoms of patients. The common clinical symptoms are: mucinous skin edema, manifested as non-pitting edema of the face, anterior tibia and hands and feet. Heart enlargement, myocardial contractility decrease, heart rate decrease, angina pectoris or aggravation of coronary atherosclerosis occur in severe cases. Thickening of the vocal cords causes hoarseness, reduced alveolar ventilation and carbon dioxide retention, sleep apnea and even dyspnea; Patients with fatigue, depression, anxiety, slow reaction, memory decline and other symptoms; In the critical stage of hypothyroidism, myxedema coma will occur. The patient presents as coma, or lethargy and fear of cold, and develops into coma in a short period, which is very dangerous.

Effects of hypothyroidism on the central nervous system. Thyroid hormones are essential for normal brain tissue growth and development and play a key role in the mammalian nervous system, especially during perinatal and subsequent two-year development of the nervous system. Thyroxine deficiency may seriously affect the development of nervous system and physiological functions, leading to mental retardation and short stature, but after a short period of supplementation, it may return to normal. Early diagnosis and treatment can therefore prevent neurological and intellectual development in children with sequelae. However, some studies have shown that even though treatment begins within four weeks of birth, children's IQs are still significantly reduced by five to 10 points, and children with severe conditions have IQs that are five to 20 points lower than those of normal children, suggesting that fetal severity is clearly linked to intelligence.

Effects of hypothyroidism on growth and development. Thyroid hormones promote the growth and maturation of cellular tissue and promote the metabolism of calcium and phosphorus in bone. Thyroxine deficiency may cause temporary disturbances in calcium and phosphorus metabolism, affecting growth and development. Thyroxine may also affect serum cholesterol and lipase levels, leading to a decline in childhood obesity rebound age, a long-term increase in body mass index, and obesity.

Effects of hypothyroidism on heart function. The incidence of cardiac abnormalities was 5.8%, which was manifested as fetal heart rate abnormality, congenital cardiac structural abnormality, pericardial effusion, ventricular hyperplasia, congenital heart block, abnormal ventricular function, changes in myocardial enzyme spectrum or arrhythmia. The main mechanisms are as follows: mRNA expression of cardiac thyroxine receptor, imbalance of decreased cardiac natrin and interaction with adrenergic - angiotensin - aldosterone system, high myocardial enzyme, clearance barrier of acidic mucosaccharide and participation in myocardial cell apoptosis [8].

(3) Examination and treatment of hypothyroidism

Neonatal disease screening is an effective method for early detection and diagnosis of CH. Children with CH can greatly improve their mental and physical development after early alternative therapy, which is good news for children with CH worldwide. The main methods of CH screening assay for neonates include radioimmunoassay (RIA), enzyme-linked immunosorbent assay (ELISA), enzyme-immunofluorescence assay (EFIA), time-resolved immunofluorescence (DELFIA) and tandem mass spectrometry. Reference indexes include serum thyroxine (T4) levels, serum triiodothyronine (T3) and rT3, blood total cholesterol levels, and oral glucose tolerance tests, as well as ancillary tests such as electrocardiogram (ECG), thyroid radionuclide scanning, molecular biology, and pathology.

These tests and methods are helpful in screening for hypothyroidism, and when the results come back, if the patient is diagnosed with hypothyroidism, then appropriate measures should be taken for treatment. Generally, hypothyroidism is treated by long-term use of thyroid hormones, except

temporary hypothyroidism caused by antithyroid drugs and subtotal thyroidectomy. In preparation selection, levothyroxine sodium (L-T4), dry thyroid powder (tablets) and levot3. L-t4 is the preferred drug, which has the characteristics of slow but lasting effect, easy to be tolerated by the patient and easy to control the dose. Dry thyroid powder also had a good effect. The thyroid hormone in the index was derived from animals, and T3 accounted for a large proportion, easily exceeding the physiological requirement. Levot3 has a quick effect and a short duration, and is generally only used in T3 inhibition tests, rescuing patients with myxoedema coma and drug withdrawal tests after thyroid cancer surgery [9].

### 2.2. Senile Heart Failure

Heart failure is disorder syndrome caused by infection, drugs, diseases and other factors of heart structure or function damage, venous return to heart blood volume can not completely discharge the heart, caused by pulmonary congestion and vena cava congestion as the performance.

(1) Pathogenesis and etiology of heart failure

Primary myocardial systolic dysfunction. Cardiomyopathy becomes more extensive, and as it develops rapidly it can lead to acute heart failure. If the disease progresses slowly, the body compensates for the time when heart failure occurs. However, after a long period of compensation and adaptation, MMC can gradually develop into chronic heart failure. Metabolic disorders can also lead to damage to the heart muscle, leading to heart failure.

Heart overload is also divided into pressure overload and volume overload. Excessive pressure load refers to the increase in the impedance load of the heart during contraction, and the tension of the myocardium also increases during contraction. Clinically, aortic and pulmonary artery pressure are commonly used as indicators of left and right ventricular pressure load. Left ventricular pressure overload is common in hypertension, aortic valve stenosis and aortic stenosis. Right ventricular pressure overload is more common in cases of pulmonary hypertension and pulmonary valve stenosis. Double-compartment overload is seen in increased blood viscosity. With increasing pressure load, ejection impedance increases, ventricular compensation thickens, and eventually transforms into heart failure. Volume overload refers to the excessive volume load that the heart undergoes during diastole and is often expressed by the end diastolic blood pressure of the ventricle. Mitral valve failure, aortic valve failure, left ventricular volume overload, ventricular septal defect, patent ductus arteriosus, etc. Common diseases of right ventricular volume overload include pulmonary and mitral valve failure and ventricular septal defect. Severe anaemia, thyroid loss, beriberi, and arteriovenous fistula often result in overloading of the two-compartment volume. In general, ventricles have a greater capacity to compensate for volume overload than pressure overload, so heart failure occurs later when volume overload occurs [10].

Diastolic restriction. There are no real symptoms of heart failure when cardiomyopathy leads to systolic limitations, but if treatment is not timely, ventricular activity is chronically restricted, and the supply of nutrients to the heart is not timely, degenerative changes in the heart muscle can occur, which can lead to heart failure.

(2) Clinical characteristics and treatment of heart failure

Heart failure has the following characteristics: caused by a variety of causes; Weak functioning of various systems and organs; the age of the patients was higher; the stability of the disease is poor, easy to relapse; the disease is complex and there may be contradictions in drug selection. This unique clinical feature not only affects its epidemiological characteristics, but also affects its clinical manifestations, treatment options and long-term survival rate.

At present, the treatment of heart failure is divided into drug therapy and non-drug therapy. Generally, drug therapy is the main non-drug therapy as a supplement, and the specific treatment plan should be made according to the actual condition of patients. Drug therapy generally includes -blockers for THE SNS system, ACEI/ARB/ARNI and MRA targeting the RAAS system, as well as novel drugs such as sinus pacer current inhibitors, vasopressin V2 receptor antagonists, and calcium sensitiors [11]. Non-drug therapy includes: healthy lifestyle and eating habits, appropriate outdoor activities and exercise, smoking cessation and alcohol withdrawal, regular sleep and rest schedule, etc.

(3) Factors influencing the decline of living ability in patients with heart failure

Age is a major factor affecting the living ability of elderly patients with heart failure. With the growth of age, the organ and tissue structure of elderly patients change, resulting in the decline of physiological function, immune function and psychological state, as well as the resistance to various external and internal adverse factors weakened, resulting in damage to the body. The risk of a decline in daily living is also increasing. At the same time, the incidence of chronic diseases also increases with age, leading to disabilities and psychological problems, such as anxiety and depression, affecting the social role of the elderly.

Culture and income levels are in direct proportion to the ability of patients with heart failure to live a daily life. Patients with high culture and income levels have a greater adherence to disease awareness, self-monitoring, personal care and medication, and are more likely to receive treatment and medical knowledge. Their social and economic status, living conditions, nutritional status and utilization of medical resources are high. Good and healthy lifestyle, such as proper diet, moderate exercise and regular check-ups, as well as a wide range of social contacts, can help you maintain a good mood and calm state of mind. This all helps to ease the decline in daily living.

The number of falls within a year is a serious threat to the life of heart failure patients, the more times, the more likely to decline in life. The nervous, musculoskeletal, and musculoskeletal systems of older patients weaken with age, and the stability of human behavior depends on the coordination of the functions of the sensory organs, nervous systems, and musculoskeletal systems. So any conceptual damage to a system increases the risk of falling. At the same time, this can interfere with daily activities such as walking, doing housework and taking the bus, as the patient's muscle fiber area shrinks, muscle strength decreases and lower limb load bearing capacity becomes weaker. Some elderly patients cannot be checked and treated in time after a fall, and the remaining sequelae will in turn affect their ability to live daily.

Depression is a risk factor for daily living in elderly patients with heart failure. Senile heart failure makes the depressed mood that patient produces easily, because course of disease is long, condition is repeated, activity is restricted, wait. This is not only not conducive to the therapeutic effect of drug therapy, and will worsen the condition, affecting the quality of life and rehabilitation effect. Suggest that nursing care with the patient's mood changes, pay attention to the depression appeared among geriatrics, and the depression after listen to and comfort patients, according to the cause of the depression, formulate the corresponding countermeasures, on the basis of restoring health to provide timely psychological consultation, promote mental health, improve the ability of daily life.

## 2.3. Thyroid hormone

Thyroid hormone is an important hormone secreted by the thyroid gland. It plays an important role in regulating the body's energy metabolism, maintaining the excitability of the nervous system

and promoting the growth and development of multiple organs and systems. The cardiovascular system, nervous system, liver and kidney are important target organs of thyroid hormone. When the thyroid function is low, the secretion of thyroid hormone is reduced, which not only affects the function of the above-mentioned target organs, but also causes organic diseases. The cardiovascular system is one of the important target organs of thyroid hormone. Reducing thyroid hormone level in vivo can directly affect cardiac muscle cells, leading to changes in ion channel activity and calcium ion concentration in cardiac muscle cells, thus changing the transmission of cardiac mechanical signals. This leads to a lower heart rate, lower heart muscle contraction, and lower heart output. Thyroid hormones can also alter the function of the heart and blood vessels by altering the function of the autonomic nervous system, and indirectly lead to changes in heart function.

(1) Mechanism of action of thyroid hormone

The effects of thyroid hormones can be divided into two categories: genetic and non-genetic. In conventional gene regulation, the role of thyroid hormone begins with its binding to specific nuclear receptors in cells. By changing the structure of the receptor, it enters the nucleus, turns on or inhibits transcription of certain genes, and alters the metabolic state of the cell. After the binding of thyroid hormone to LBD, TR showed significant conformational changes and was separated from the original co-inhibitory complex. TR is then combined with other co-activators to form new complexes. Certain factors of the complex have the ability to alter histones, resulting in changes in acetylation and methylation of histones, and the absorption of RNA polymerases to bind to promoter regions of target genes, leading to transcription of related genes [12].

Many of the physiological functions of thyroid hormones are not controlled by nuclear receptors and gene transcription. Non-genetic effects occur only briefly, perhaps within seconds to minutes. These effects not only regulate the metabolic function of cells, but also affect the formation of tissues and organs, angiogenesis and malignant transformation of tumor cells. The extracellular receptors of thyroid hormone are mainly distributed in membrane, cytoskeleton, cytoplasm, mitochondria, etc. The extracellular receptors are distributed differently and often have different physiological functions.

(2) Thyroid hormones and organ function

Thyroid hormones and their receptors play an important role in the maintenance, growth and development of digestive system, circulatory system and nervous system homeostasis.

Thyroid hormones can stimulate the proliferation of liver cells, leading to liver hyperplasia. Unlike liver cell proliferation induced by inflammatory response and proto-oncogene activation, thyroid hormone-induced liver cell proliferation does not involve activation of transcription factors or signaling pathways. Although thyroid hormone can promote the regeneration and proliferation of liver cells, it can also reduce the incidence of liver cancer and other organ metastasis by inhibiting the hyperplasia of liver nodules caused by the proto-oncogene. Thyroid hormone activates islet cells and has a significant effect on the development of the sensory nervous system. It can also directly or indirectly affect the cardiovascular system.

## 3. Experiments of Hypothyroidism and Heart Failure

### 3.1. Research Objects and Methods

(1) Research Objects

76 elderly patients with heart failure who suffered from hypothyroidism at the same time in the inpatient department of a hospital were selected as the study objects, 42 males and 34 females, all over 60 years old. The oldest is 92 years old and the youngest is 60 years old. The number of male

and female patients in the 70-79 age group is the largest. According to the test, P > 0.05, there is no difference in age distribution between different genders of patients, as shown in Table 1:

*Table 1. Age and gender distribution of patients*

| Age range | Man | Woman | Total |
|---|---|---|---|
| 60-69 | 9 | 11 | 20 |
| 70-79 | 21 | 19 | 40 |
| 80-89 | 8 | 3 | 11 |
| ≥90 | 4 | 1 | 5 |
| Total | 42 | 34 | 76 |

Note: $X^2$=0.591, P=0.623

The variance calculation is shown in Formula 1:

$$X^2 = \frac{\sum_{i=1}^{n}\left(X_i - \overline{X}\right)^2}{n-1} \quad (1)$$

(2) Inclusion criteria

Age ≥60 years old;

Patients with confirmed hypothyroidism and heart failure admitted to the hospital;

Stable and conscious;

Informed and voluntary participation in this study.

(3) Exclusion criteria

The selected cases had no record of thyroid disease, severe liver and kidney dysfunction, malignant tumors, autoimmune diseases, etc., no recent use of drugs that affect thyroid hormone levels, and no consumption of foods containing large amounts of iodine, such as seafood. In the event of death during treatment or in the event of forced use of drugs affecting thyroid function (e.g., amiodarone) due to medical conditions, they are excluded.

(4) Research methods

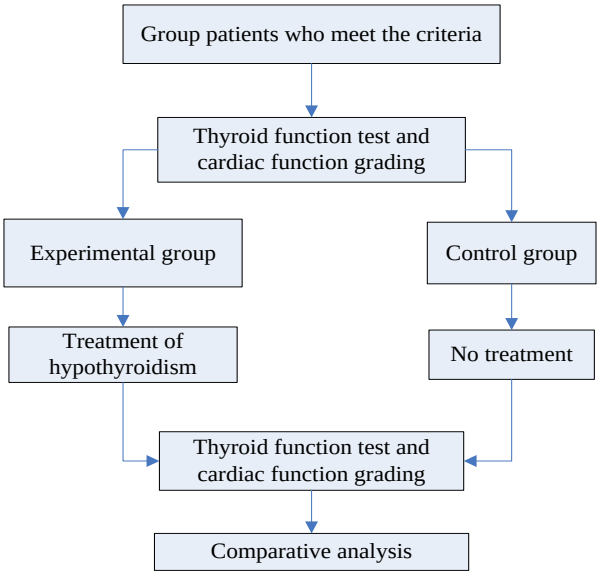


*Figure 1. Flow chart of the research*

First, 76 patients who met the inclusion criteria were tested for thyroid function and graded for

heart function. Then, they were randomly divided into two groups, 38 in the experimental group and 38 in the control group. Under the condition of ensuring the same external conditions such as diet and rest, the experimental group received routine thyroid function reduction treatment, taking levothyroxine sodium tablets orally every day, while the control group received no treatment. After two weeks of treatment, thyroid function differences between the two groups were analyzed and graded again to reach a conclusion. The research flow chart is shown in Figure 1.

### 3.2. Cardiac Function Classification Method

The NYHA heart function Ⅰ- Ⅳ classification: Ⅰ patients, have heart disease, but does not affect its physical activity, without this level of patients in this study; Ⅱ patients, limited physical activity mild, regular physical activity can cause excessive fatigue, heart palpitations, asthma, or angina pectoris; Ⅲpatients, limited physical activity significantly, mild physical activity garage cause excessive fatigue, heart palpitations, asthma, or angina pectoris; Ⅳ patients, Cardiac insufficiency or angina symptoms may also occur when physical activity is not performed, and any physical activity increases discomfort.

### 3.3. Thyroid Function Detection and Treatment

After the heart function classification was performed according to NYHA classification, fasting venous blood was extracted to check thyroid function (T3, FT3, rT3, TSH). Immunochemiluminescence (ICMA) was used for detection. The instrument was Centaur XP automatic chemiluminescence immunoanalyzer and the kit was provided by Beckman, USA.

The experimental group received routine hypothyroidism treatment. Levothyroxine sodium was taken orally every morning. The control group did not take any drugs.

## 4. Discussion of Relationship Between Hypothyroidism and Heart Failure in the Elderly

### 4.1. Comparison of Thyroid Function

(1) Comparison of thyroid function between the experimental group and the control group before treatment.

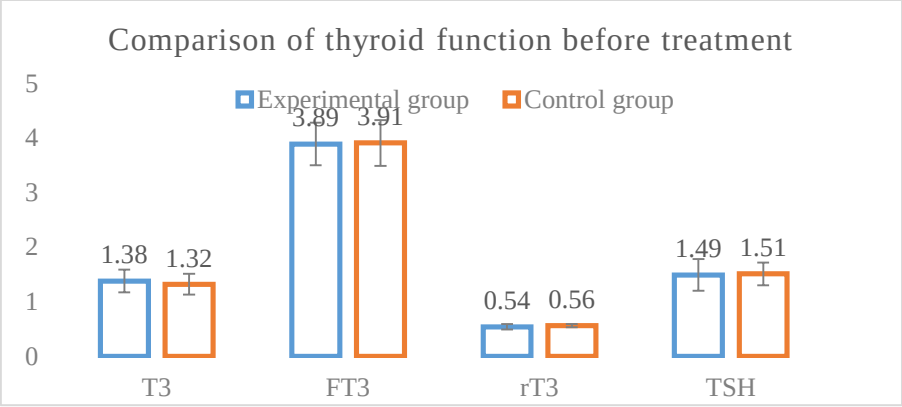


*Figure 2. Comparison of thyroid function before treatment*

As shown in Figure 2, there were statistically significant differences in thyroid function T3, FT3,

rT3 and TSH between the two groups before treatment (P<0.01). There was no significant difference in thyroid function between the two groups. T3 in the experimental group was higher than that of the control group, while FT3, rT3 and TSH were slightly lower than that of the control group. As both groups were elderly patients with chronic thyroid dysfunction and heart failure, their physical qualities were similar and their thyroid function was not in good condition.

(2) Comparison of thyroid function between the experimental group and the control group before and after treatment

As shown in Figure 3, thyroid function in the experimental group improved after two weeks of treatment. Among them, T3 and FT3 increased, T3 increased by 0.41 nmol/ L, and FT3 increased by 0.22 pmol/ L. TSH and rT3 decreased by 0.15ng/ml, and TSH decreased by 0.11uIU/ml. Because the control group did not receive drug treatment, its thyroid function was the same as that two weeks ago. Comparing the two groups, the thyroid function of the experimental group after treatment was better than that of the control group.Under the influence of stress, hypoxia, acidosis and other factors, the accelerated utilization of T3 in the body and the increased clearance rate of T3 can lead to decreased plasma T3 level, decreased renal blood flow and liver stasis, which slow down the clearance rate of rT3 in liver and kidney and lead to increased rT3. Such symptoms can be alleviated after treatment, so the T3 increase and rT3 decrease in the experimental group after treatment.

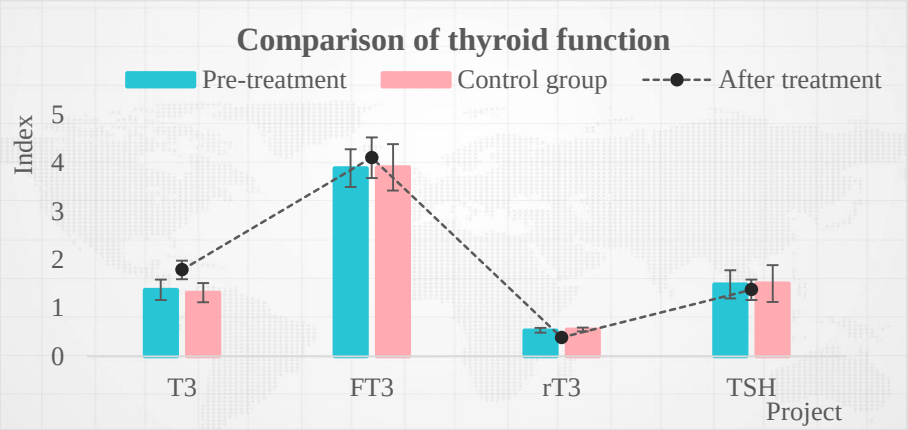


*Figure 3. Comparison of thyroid function between the experimental group and the control group before and after treatment*

## 4.2. Comparison of Cardiac Functions between the Two Groups

(1) Comparison of grading distribution of cardiac function between the experimental group and the control group before treatment

From Figure 4, the two groups before treatment in patients with cardiac function grade distribution range similar to that of the experimental group in the cardiac function level Ⅲ accounted for most patients, 50%; Heart function in the control group and class Ⅲ patients most, accounting for 55%. Ⅳ level in experimental group than control group in patients with more than 2%, less Ⅱ level patients and the control group, 21%, the experimental group was 26%. It can be seen that the degree of heart failure is similar between the two groups, which is conducive to the comparison of data after treatment.

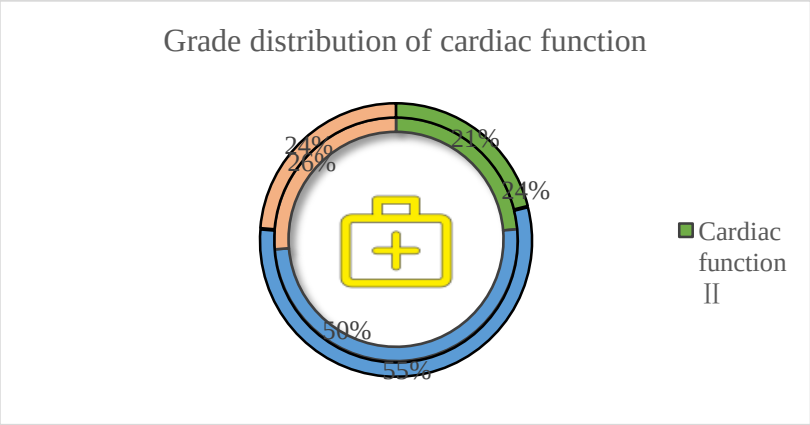


*Figure 4. Grade distribution of cardiac function*

(2) Comparison of cardiac function grades before and after treatment in the experimental group

As shown in Figure 5, after two weeks of medication, the experimental group of patients with cardiac function classification of distribution, great changes have been accounted for the most by level into Ⅱ Ⅲ level of patients before, because there is no any drug therapy and control group, two weeks, heart function classification not only isn't going down, there are two cases of transformation to Ⅲ level grade Ⅱ patients. In patients with heart failure with grade II or III, compensatory TSH is increased. Beware Ⅳ level, and poor compensatory TSH relatively without increasing or declining, can be used as the objective indicators monitoring disease progression in patients with heart failure.

There was a negative correlation between T3/rT3 and severity of cardiac function. RT3 was positively correlated with the severity of cardiac function. TSH has no correlation with the severity of cardiac function, among which T3/rT3 is strongly correlated with the severity of cardiac function. The more severe the heart failure, the more significant the decrease of T3 and the more significant the increase of rT3.This proves that two weeks of drug treatment is not only effective in reducing hypothyroidism, but also improves patients' heart function, which is also effective in treating heart failure.

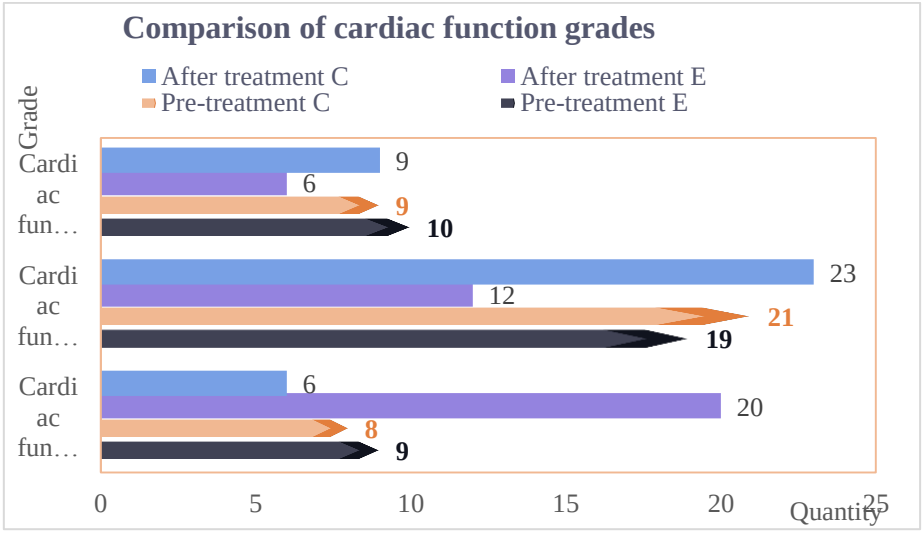


*Figure 5. Comparison of cardiac function grades*

## 5. Conclusion

Hypothyroidism, a common disease in children, also has a serious impact on the health of the elderly. These disorders are usually caused by low levels of thyroid hormones and can run in families. It will reduce the elderly already low immunity, the degree of reduction will appear dropsy hair, serious affect the patient's heart and lung function, angina and breathing difficulties and even lead to coma. At present, the treatment of hypothyroidism patients is generally drug therapy, which has the advantages of easy tolerance and lasting efficacy, but the effect is relatively slow. Due to the complicated physical conditions of the elderly, they may suffer from multiple diseases at the same time. Therefore, the type and dose of drugs should be determined according to the actual conditions of the patients.

Heart failure is a major killer of the health of the elderly, with many negative effects on their physical, mental and life abilities. Heart failure is usually caused by a variety of basic diseases, with coronary heart disease, hypertensive heart disease, heart valve disease as the main cause. Complex etiology and symptoms reduce the efficiency of the diagnosis and treatment of this disease. Although there have been numerous studies on heart failure, it still poses a serious threat to the health of the elderly. At present, the treatment of heart failure is divided into drug therapy and non-drug therapy. Patients with mild symptoms that have little impact on their ability to live can generally be treated with non-drug therapy, with no side effects, while those with severe symptoms need drug therapy, and a combination of the two treatments can be used if necessary.

Hypothyroidism is strongly associated with heart failure. Hypothyroidism increases the likelihood of heart failure because inadequate or abnormal thyroid hormones affect the functioning of the cardiovascular system, impair normal cardiac diastolic function, and increase the load on the heart, both directly and indirectly leading to heart failure. The normal secretion of thyroid hormone can improve the myocardial systolic function increase myocardial oxygen consumption and improve the myocardial diastolic function, reduce cardiac load, and improve the stress ability of heart and blood vessels of adrenaline, so will the thyroid function index as an important examination index, can effectively prevent heart failure, on the cause analysis and treatment of heart failure and also to have certain contribution.

## Funding

This article is not supported by any foundation.

## Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

## Conflict of Interest

The author states that this article has no conflict of interest.

## References

*[1] Metra, M., & Teerlink, J. R. (2017). "Heart Failure". The Lancet, 390(10106), 1422.*
*[2] Rich, M. W. (2020). "Heart Failure Disease Management Programs: Efficacy and Limitations",*

*Journal of Cardiac Failure, 26(3), pp.191-192. DOI: 10.1016/S0002-9343(01)00632-5*

*[3] Roy, S., Banerjee, U., & Dasgupta, A. (2016). "Protective Role of Bilirubin against Increase in Hscrp in Different Stages of Hypothyroidism. Indian Journal of Clinical Biochemistry, 31(1), 43-49. DOI: 10.1007/s12291-015-0495-z*

*[4] Lv, Z., Cheng, J., Huang, S., Zhang, Y., Wu, S., & Qiu, Y., et al. (2016). "Dehp Induces Obesity and Hypothyroidism through Both Central and Peripheral Pathways in c3h/he Mice", Obesity, 24(2), 368-378. DOI: 10.1002/oby.21359*

*[5] Gregg C Fonarow, William T Abraham, Nancy M Albert, Wendy Gattis Stough, Mihai Gheorghiade, & Barry H Greenberg. (2016). "Influence of a Performance-Improvement Initiative on Quality of Care for Patients Hospitalized with Heart Failure: Results of the Organized Program to Initiate Lifesaving Treatment in Hospitalized Patients with Heart Failure (Optimize-hf)", Archives Of Internal Medicine, 167(14), pp.1493-1502 DOI: 10.1001/archinte. 167.14.1493*

*[6] López Fontana, C. M., Zyla, L. E., Santiano, F. E., Sasso, C. V., Cuello-Carrión, F. D., & Pistone Creydt, V., et al. (2017). "Hypothyroidism Reduces Mammary Tumor Progression Via B-Catenin-Activated Intrinsic Apoptotic Pathway in Rats", Histochemistry & Cell Biology, 147(6), 759-769. DOI: 10.1007/s00418-017-1544-x*

*[7] El-Ghareeb, A. A., A M El-Bakry², R G Ahmed², & Asmaa Gaber² (2016). "Effects of Zinc Supplementation in Neonatal Hypothyroidism and Cerebellar Distortion Induced by Maternal Carbimazole", Asian Journal of Applied Sciences, 4(4), 2321-2893.*

*[8] Fallahi, P., Ferrari, S. M., & Antonelli, A. (2016). "Orall-Thyroxine Liquid Versus Tablet in Patients with hypothyroidism Without Malabsorption: a Prospective Study", Endocrine, 52(3), pp.597-601. DOI: 10.1007/s12020-015-0836-y*

*[9] Persani, L., & Bonomi, M. (2017). "The Multiple Genetic Causes of Central Hypothyroidism", Best Practice & Research: Clinical Endocrinology & Metabolism, 31(2), 255. DOI: 10.1016/ j.beem.2017.04.003*

*[10] Roger Véronique L. (2018). "Heart Failure Epidemic", Circulation, 138(1), 25-28.*

*[11] Celano, C. M., Villegas, A. C., Albanese, A. M., Gaggin, H. K., & Huffman, J. C. (2018). "Depression and Anxiety in Heart Failure", Harvard Review of Psychiatry, 26(4), pp.175-184.*

*[12] Dharmarajan, K., & Rich, M. W. (2017). "Epidemiology, Pathophysiology, and Prognosis of Heart Failure in Older Adults", Heart Failure Clinics, 13(3), pp.417-426. DOI: 10.1016/j.hfc. 2017.02.001*